DOCUMENT RESUME

ED 205 389 SE 035 441

TITLE	National R&D Spending Expected to Approach $80 Billion in 1982. Science Resources Studies Highlights.
INSTITUTION	National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
REPORT NO	NSF-81-314
PUB DATE	30 Jun 81
NOTE	5p.: Not available in hard copy due to marginal legibility of original document.
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Budgets: Development: *Expenditures: *Federal Aid: Federal Programs: *Financial Support: Industry: Research: *Research and Development Centers: Science Education: *Scientific Research: Technology

ABSTRACT

Presented are data based on the revised 1982 federal budget indicating that national research and development (R&D) spending should increase significantly by 1982, particularly in the area of national defense. Summaries are presented, in chart form, of past and projected financial support for basic research, applied research and development. (SK)

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SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION WASHINGTON, D.C. 20550 JUNE 30, 1981 NSF 81-314

National R&D Spending Expected to Approach $80 Billion in 1982

Highlights

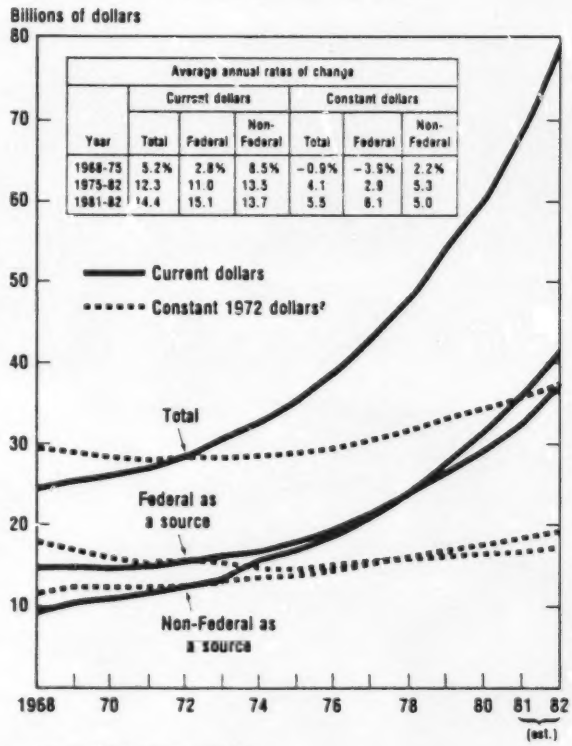
• Total U.S. expenditures for research and development in 1982 are expected to reach $79 billion, 14 percent more than the total in 1981. The increase between the two years in constant dollars is estimated at 6 percent, when using the Office of Management and Budget's 8-percent estimate of inflation for 1982. R&D expenditures have increased in real terms each year since 1975, averaging 4 percent annually through 1982[1] (chart 1). These increases result largely from greater expenditures for energy, space, and defense programs as well as from general industrial growth.

• Based on the revised 1982 budget, Federal R&D spending is expected to increase by 15 percent over the 1981 figure to $37.6 billion. All of this growth probably will result from increased defense spending, which is expected to increase some 2 percent in real terms between 1981 and 1982. All other Federal agencies combined should record a drop of around 4 percent between the two years.

• During the midsixties the Federal Government funded nearly two-thirds of the Nation's R&D effort. By 1979 Federal support had fallen to less than one-half as growth in industrial R&D support outpaced Federal funding over the midsixties to midseventies period. With the major increases included in the 1982 budget for defense R&D spending for 1981 and 1982, growth in the overall level of Federal R&D support for 1982 is expected to increase somewhat faster than that of non-Federal support. The Federal share of national R&D spending, however, is still expected to remain at slightly less than one-half the national R&D effort during that year.

• Defense/space R&D support as a percent of the national R&D effort is expected to increase in 1982 because of the relatively large increase in Federal defense R&D outlays proposed for that year. Conversely, civilian R&D funds as a percent of the national R&D effort are expected to drop. This includes industry's own funds (all of which are classified as civilian).

Chart 1. National R&D expenditures



Average annual rates of change

Year	Current dollars: Total	Current dollars: Federal	Current dollars: Non-Federal	Constant dollars: Total	Constant dollars: Federal	Constant dollars: Non-Federal
1968-75	5.2%	2.8%	8.5%	−0.9%	−3.5%	2.2%
1975-82	12.3	11.0	13.5	4.1	2.9	5.3
1981-82	14.4	15.1	13.7	5.5	6.1	5.0

²Based on GNP implicit price deflator.

SOURCE: National Science Foundation

[1]Average annual percent changes have been computed using compound rates of change.

Prepared in the R&D Economic Studies Section, Division of Science Resources Studies

SE 035 441

• National R&D spending, as a percent of the gross national product (GNP), remained in a range of 2.2 percent to 2.3 percent between 1973 and 1978. Since 1978 this R&D/GNP ratio has increased slightly each year and is expected to reach 2.4 percent in 1982.

R&D Support

In 1982 the Nation is expected to invest $79 billion on research and development, 14 percent more than in 1981 and more than double the amount spent in 1975. Real growth between 1975 and 1982 is expected to average approximately 4 percent per year following a 10-year period of no growth in real R&D investment.

The Federal Government is expected to provide nearly $38 billion for the support of research and development in 1982, 15 percent more than in 1981. In real terms, Federal R&D support has increased each year since 1975, averaging an estimated 3 percent per year through 1982. These increases reflected the growing national emphasis on energy conservation and development through 1980. Based on data shown in the March revision of the Federal 1982 budget, the R&D increases in 1981 and 1982 will reflect a strong emphasis on defense activities.

Non-Federal R&D support should exceed $41 billion in 1982, 13 percent more than in the previous year. Nearly 95 percent of the non-Federal R&D support is provided by industry. In real terms, since 1975 non-Federal support has been increasing at nearly twice the rate as Federal. This growth resulted primarily from increased industry spending, much of which went for energy and environmental programs. In addition, industrial R&D funding growth reflects a shift in corporate strategy[2] which increases the emphasis on research and development as a source of future company growth through new market opportunities.

Industry-performed R&D activities account for about 70 percent of the U.S. total each year — an expected $57 billion in 1982. In the late sixties, the Government provided nearly one-half of the funds for research and development performed by industry. From the midseventies through 1980, however, industry's own funds accounted for approximately two-thirds of its R&D effort. The drop in Government R&D funds to industry resulted mainly from cutbacks in Federal defense and space programs. The planned expansion in defense R&D spending in 1981 and 1982[3] indicate that this trend may be reversed.

R&D/GNP

Total R&D expenditures are expected to account for 2.4 percent of the Nation's GNP in 1982, the same ratio as in the previous year but up from 2.2 percent in 1978 (chart 2). This ratio peaked in 1964 at 3.0 percent, then

[2]Information obtained from numerous interviews with industry R&D officials during 1980.

[3]See National Science Foundation, Division of Science Resources Studies, *Revised Special Analysis of the R&D Component of the 1981 and 1982 Budgets of the U.S. Government* (Washington, D.C., 1981).

Funds for research and development

[Millions of dollars]

Year	Total	Federal Government	Industry[1]	Academic sector		Other nonprofit institutions[1]
				Universities and colleges	Associated FFRDC's[2]	
	By performer					
1975	$35,169	$ 5,310	$24,187	$3,409	$ 987	$1,276
1976	38,935	5,688	26,997	3,727	1,147	1,376
1977	42,923	6,053	29,928	4,063	1,384	1,495
1978	48,023	6,856	33,164	4,614	1,717	1,672
1979	54,215	7,497	37,606	5,183	1,935	1,994
1980 (prel.)	61,127	8,052	42,750	5,950	2,200	2,175
1981 (est.)	69,065	8,965	49,150	6,300	2,300	2,350
1982 (est.)	79,000	10,100	57,000	6,800	2,350	2,750
	By source					
1975	35,169	18,085	15,820	749	—	535
1976	38,935	19,833	17,694	808	—	600
1977	42,923	21,374	19,696	881	—	672
1978	48,023	23,893	22,336	1,028	—	766
1979	54,215	26,556	25,638	1,183	—	838
1980 (prel.)	61,127	29,302	29,475	1,385	—	965
1981 (est.)	69,065	32,665	33,865	1,485	—	1,050
1982 (est.)	79,000	37,600	38,600	1,550	—	1,250

[1]Includes expenditures for federally funded research and development centers (FFRDC's) administered by this sector. They account for less than 5 percent and 15 percent, respectively, of the industry and nonprofit performance totals.
[2]FFRDC's administered by individual universities and colleges and by university consortia.

SOURCE: National Science Foundation

declined steadily to 2.3 percent in 1973. This drop was caused primarily by the slowdown in the growth of Federal R&D programs through the midseventies. Since that time increases in both Federal and non-Federal R&D efforts concerning energy have been a major factor behind the stabilization of this ratio between 1973 and 1978. The increases after 1978 reflect primarily a real-term leveling of the GNP between 1979 and 1981. Excluding defense and space funding from the R&D totals, the resulting civilian R&D/GNP ratio remained relatively constant at about 1.5 percent between the midsixties and late seventies, but increased to 1.6 percent in 1979, where it should remain through 1982.

International comparisons show that the United States spends more on R&D activities than all other Western countries and Japan, combined. Relative to the GNP, however, the United States ranks second to West Germany with the United Kingdom and Japan close behind.

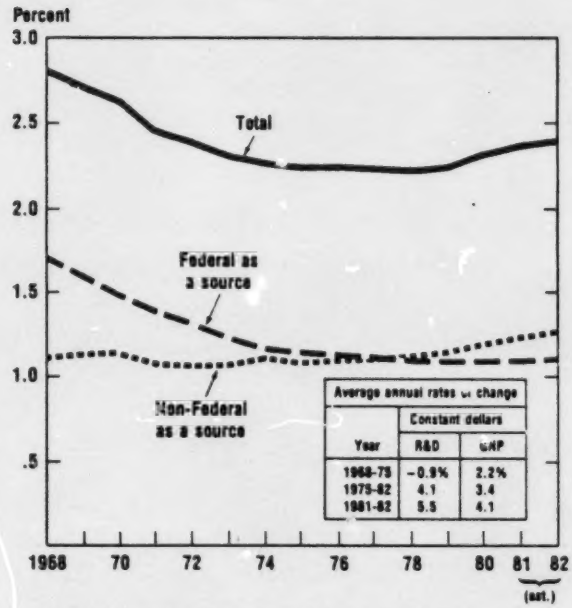
Basic Research, Applied Research, and Development

Total research spending is expected to reach $27 billion in 1982, 12 percent more than in 1981. Development spending is expected to increase 16 percent between the two years to $52 billion, reflecting large proposed increases in Federal defense spending. Even with the higher increases projected for development in 1982, however, the ratio of research to development expenditures is expected to remain at about 1:2, the same ratio that has existed since 1975.

Of the research total, basic research is expected to reach $9.8 billion in 1982, 11 percent more than in 1981. In real terms, basic research spending has increased each year since 1975, averaging 4 percent annually through 1980 (chart 3). The Federal Government, which supports about 70 percent of the Nation's basic research, also accounted for about 70 percent of the 1975-80 increase reflecting the emphasis by recent administrations to strengthen Federal basic research funding. In the previous seven years, basic research spending decreased by 8 percent in real terms with virtually all of the decrease resulting from Federal cutbacks. Industry basic research support which also showed a decrease in real terms during the 1968-75 period, has increased each year since, reflecting higher spending levels on energy and pollution abatement programs.

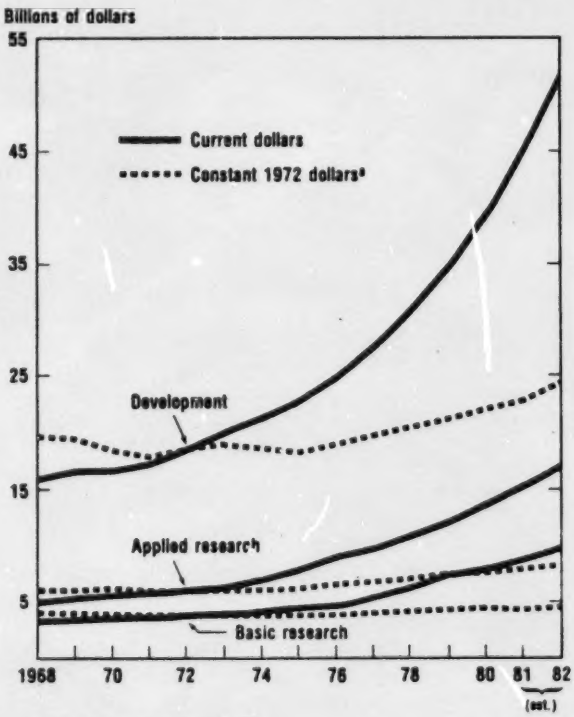
Universities and colleges perform about one-half the Nation's basic research with the Federal Government providing 70 percent of the university expenditures total. In large part, university basic research efforts have emphasized programs in the life sciences, with most of this funding coming from the Department of Health and Human Services. Industry, the second largest basic research performer with nearly 20 percent of the national total, has emphasized programs dealing with energy conservation and supply.

Chart 2. R&D/GNP



SOURCE: National Science Foundation and U.S. Department of Commerce

Chart 3. National basic research, applied research, and development expenditures



[a]Based on GNP implicit price deflator.
SOURCE: National Science Foundation.

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National applied research spending is expected to exceed $17 billion in 1982, 13 percent more than in 1981. In real terms, national applied research spending has been increasing each year since 1975, averaging an estimated 4 percent annually through 1982. This real-term growth has resulted mainly from increased industrial support, particularly in energy-related areas. Industry support of applied research is expected to increase by nearly 50 percent in real terms between 1975 and 1982. Federal applied research support, which increased 15 percent between 1975 and 1980, is expected to remain relatively level between 1980 and 1982.

Development spending is expected to show the largest growth in 1982, 16 percent over the 1981 level. In real terms, the expected increase will be 7 percent, the largest 1-year increase since 1964. The Federal Government and industry, which account for over 99 percent of the development funding, have each been increasing support in real terms since 1975. During the 1975-80 period, this growth reflected the national emphasis on energy, and since, increased defense spending.

National Science Foundation
Washington, D C 20550

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